REMARKS/ARGUMENTS

Claims 1, 2, 4, 6-11, 14 and 15 stand rejected in the outstanding Official Action with claims 3, 12, 13 and 16 withdrawn from consideration. Claim 9 has been cancelled without prejudice, claims 17-19 added and claims 1, 2, 10, 11, 14 and 15 amended. Accordingly, claims 1, 2, 4, 6-8, 10, 11 and 14-19 remain in this application.

In general, the independent claims have been amended to relate to a light emitting embodiment and to further specify that the device has a luminescence emission spectrum showing a surface Plasmon (SP) polariton mode contribution which is associated with avoidance of destructive interference corresponding to two scattering processes and which would otherwise counteract that contribution. The claims also refer to the spectrum showing a second SP polariton mode contribution associated with one scattering process.

Accordingly, the invention set out in amended claim 1 provides increased luminescence efficiency because it exhibits light output associated with two SP polaritron mode contributions and not one. This can be seen in Applicants' Figure 6 described on page 21 in the last paragraph. Figure 6 shows the emission spectrum from the structure of Figure 5 and one emission peak is shown for the SP mode associated with the Ag/Air interface between the metal electrode and air, and a different (and stronger) emission peak is shown for the SP mode associated with the Ag/Alq3 interface between the metal electrode and the emissive layer.

Applicants' claimed invention therefore overcomes the problem illustrated in Figure 3 of Applicants' specification and discussed in the last paragraph on page 19. Figure 3 shows only one emission peak which is for the SP polaritron mode associated with the Ag/Air interface. This is more weakly coupled to radiation output than the mode associated with the Ag/Alq3 interface and is therefore less important to luminescence efficiency. Figures 3 and 6 show that

Figure 3 lacks a contribution from the SP mode associated with the Ag/Alq3 interface between the metal electrode and emissive layer.

Claims 1, 2, 4, 6-10, 14 and 15 stand rejected under 35 U.S.C. § 103 as being obvious over Scherer (U. S. Patent 6,534,798) in view of Samuel (WO 00/70691). The Examiner finally admits that Scherer does not teach "said metal electrode is covering and separating said entire layer from air" as required by independent claims 1, 11 and 14 and this admission is appreciated.

In the Scherer reference, Figure 18D shows the luminescence emission for a patterned structure and it shows only a single plasmon-related emission peak. Scherer is silent regarding which SP polariton mode is associated with this emission peak. In fact, Scherer is silent with respect to whether any SP mode is relevant and restricts his discussion with respect to surface plasmons as saying they are "coupled through the grating." However, emission is associated with only one SP mode and therefore luminescence efficiency will be inferior to that associated with two modes exhibited by Applicants' invention as recited in the independent claims.

In the outstanding Official Action, the Examiner alleges that Scherer discloses all limitations of Applicants' independent claims 1 and 14 except that Scherer's periodic microstructure has a plurality of holes in the electrode layer. Those of ordinary skill in the art will be clearly aware of the fact that Scherer cannot be disclosing a thin semitransparent metal electrode because if it did, the perforations in Scherer's top metal layer would not be essential to permit light to pass through the electrode (Scherer discusses the essential nature of the perforations). Therefore, Scherer does not contain the teaching of all limitations of claims 1 and 14 as contended by the Examiner.

The Examiner also alleges that the secondary reference to Samuel discloses an analogous optoelectronic device with a metal electrode having a periodic microstructure grating. The

Examiner then provides an obviousness conclusion, but without any support or rationale for combining the two references. These conclusions about Samuel and the combination with Scherer are respectfully traversed for a number of reasons.

First, Samuel and Scherer operate in completely different manners. Samuel discloses use of a **reflection** grating (the thick 200nm Al layer) shown in Figure 2 and discussed on page 18, lines 2-4, with light output via the silica substrate. Scherer, on the other hand, discloses use of a transmission grating, i.e., Ag layer 20-40nm thick before patterning to form the grating, as discussed at column 5, lines 27-42, with light output via the grating electrode. Scherer actually states at column 14, lines 12-18 that "these measurements . . . lead us to several important conclusions. One of these was that **pinholes** in the semitransparent metal 22 improve light extraction. For this reason we decided to perforate the top metal layer 22 completely" (emphasis added).

As a result of the above, Scherer teaches that perforations in the top metal layer are essential to improve light extraction and thus teaches away from Samuel's thick non-perforated, top metal layer which utilizes reflection (with light output via the silica substrate and not through a thin semitransparent metal layer).

Second, as a result of the above, the combination of Scherer and Samuel does not work, because it results in no light output whatsoever from the Scherer LED. Instead, the light is confined to the internal region of the LED because Scherer's thick silver mirror 18 (as defined in Scherer, column 5, lines 14-15) and Samuel's 200nm thick reflection grating (as taught in Samuel, Figure 2, page 18, lines 2-4) prevent any light at all from escaping. Since the distinct modes of operation of the Scherer and Samuel references conflict with one another, one of ordinary skill in the art would not have combined these references.

Because the Examiner has not demonstrated where the Scherer and Samuel references teach every element recited in Applicants' independent claims 1 and 14 and because he has failed to provide any explicit "analysis" as to why one would pick and choose elements from the various references and then combine them in the manner of Applicants' claims, he has failed to meet the two primary tests required to establish a *prima facie* case of obviousness.

Third, applicants have also provided evidence that the two cited references are simply incompatible in providing a light emitting device and it is believed the Examiner will have great difficulty in disproving these facts. Consequently, even if it would be obvious to try the two teachings together, they are clearly incompatible, thereby leading one of ordinary skill in the art away from the combination and rebutting any *prima facie* case of obviousness made.

Accordingly, claims 1, 2, 4, 6-10, 14 and 15 are not properly rejected under 35 USC §103 over the Scherer/Samuel combination and any further rejection thereunder is respectfully traversed.

Claim 11 stands rejected under 35 USC §103 as unpatentable over Arnold (presumably a reference to U.S. Publication 2004/0012328). The Examiner admits that Arnold fails to teach "the microstructure of the two metal surfaces are out of phase by substantially π radians" and this admission is very much appreciated.

Firstly, there is no requirement that to be patentable, an invention must provide an unexpected or unpredictable result. Rather, the test is whether Applicants' claimed combination of structures would be obvious in view of the Arnold reference by itself (since no other references are noted). The Examiner has provided no evidence to indicate that one of ordinary skill in the art would be led somehow to modify the Arnold reference in the manner required by Applicants' independent claim 11.

Secondly, the Examiner's unsupported conclusion that the limitation of "substantially π radians" does not lead to unexpected or unpredictable results is completely unsupported. This is mere speculation on the part of the Examiner and is simply no substitute for prior art containing this teaching.

Thirdly, the "**substantially π radians**" does indeed lead to the unexpected result in the present invention and this would be apparent to one having ordinary skill in the art when reading applicant's specification. As discussed, in a light emitting diode embodiment, a contribution to the overall luminescence emission, which would ordinarily be absent due to destructive interference, is now present because the emission due to the two metal surfaces is out of phase by "substantially π radians." The result of Applicants' discovery and this claim limitation is that luminescence efficiency is improved in the claimed device and the possibility of such improvement is undisclosed in the Arnold reference. The Arnold reference does not provide a luminescence emission spectrum and all Arnold's drawings are of light emitting diode embodiments which show **in-phase** upper and lower grating structures just as in the prior art noted in Applicants' specification (see Figure 1A which illustrates the basic problem) which problem only the Applicants have appreciated.

Unless the Examiner has any evidence of record to establish that Arnold, without discussing the problem as noted in Applicants' specification and without appreciating potential solutions, can somehow automatically disclose Applicants' claimed solution, Arnold cannot support a rejection of claim 11 under 35 USC §103 and any further rejection thereunder is respectfully traversed.

Having responded to all objections and rejections set forth in the outstanding Official Action, it is submitted that claims 1, 2, 4, 6-8, 10, 11 and 14-19 are all clearly patentable over the

cited prior art and Notice for Allowance with respect thereto is respectfully requested. In the event the Examiner or his supervisor is of the opinion that a brief telephone or personal interview will facilitate allowance of one or more of the claims, he is respectfully requested to contact Applicants' undersigned representative.

Respectfully submitted,

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